WHAT IS CLAIMED IS:

1. A hybrid reactive power compensation device parallel-connected to a power system to provide reactive power to thereby improve the power factor, comprising:

a passive type reactive power compensator; and

an active type reactive power compensator serially connected to the passive type reactive power compensator;

wherein the passive type reactive power compensator provides the reactive power so that power capacity of the active type reactive power compensator is reduced; the active type reactive power compensator of the hybrid reactive power compensation device can supply the linearly adjustable reactive power within a predetermined range; the active type reactive power compensator is adapted to provide with a serial-connected virtual harmonic damping, thereby avoiding the destruction of the passive type reactive power compensator caused by the power resonance.

2. The hybrid reactive power compensation device as defined in Claim 1, wherein the passive type reactive power compensator is an AC power capacitor or a thyristor switching capacitor.

3. The hybrid reactive power compensation device as defined in Claim 1, wherein the active type reactive power compensator is consisted of a

power converter, a DC power capacitor, a high-frequency ripple filter and a controller.

4. The hybrid reactive power compensation device as defined in Claim 1, wherein the active type reactive power compensator adopts a voltage mode control.

5. The hybrid reactive power compensation device as defined in Claim 4, wherein the active type reactive power compensator includes a power converter adapted to generate a voltage which is consisted of three voltage control signals.

6. The hybrid reactive power compensation device as defined in Claim 4, wherein the first voltage control signal is adapted to accomplish a function for adjusting reactive power and has a fundamental voltage control signal in phase with a voltage of a power system; the second voltage control signal is adapted to regulate a DC power capacitor of the power converter and has a sinusoidal signal leading with the voltage signal of fundamental component of the power system by 90 degrees; the third voltage control signal is adapted to provide with a virtual harmonic damping to thereby avoid the destruction of the passive type reactive power compensator caused by the power resonance and is obtained by amplifying a harmonic component.

7. The hybrid reactive power compensation device as defined in Claim 1, wherein the hybrid reactive power compensation device is parallel-connected to an automatic power factor regulator system, the automatic power factor regulator system is able to adjust the reactive power for rough tuning, and the hybrid reactive power compensation device can supply a sinusoidal current to linearly adjust the reactive power for fine tuning that it can improve the input power factor to be closed to unity, thereby reducing the capacity of the hybrid reactive power compensation device.

8. The hybrid reactive power compensation device as defined in Claim 1, wherein the hybrid reactive power compensation device is serial-connected to a thyristor switching capacitor, the thyristor switching capacitor is able to adjust the reactive power for rough tuning, and the hybrid reactive power compensation device can supply a sinusoidal current to linearly adjust the reactive power for fine tuning that it can improve the input power factor to be closed to unity, thereby reducing the capacity of the hybrid reactive power compensation device.